


3. Trends and Conditions

connecting REDMOND

Transportation Master Plan

Figure 3.1 SR 520 during the evening traffic

Contents of this Chapter

This chapter of the Transportation Master Plan defines mobility and offers a snapshot of transportation trends since the early 1990's. Topics discussed include:

- ✓ Understanding Mobility
- ✓ Recent Community Travel Trends
- ✓ Community Travel Forecasts

Introduction

Understanding Mobility

We value transportation. Our residents and our workers spend almost a quarter of their household incomes buying transportation for their families. They spend several hours per week in automobiles traveling an average of 23.8 miles per capita per day.

However, while it is clear that we do like to drive, we also like to be able to travel by other means – transit, carpool, walking and bicycling. Given good levels of service in other modes, we will shift some of our trip making out of single occupant vehicles. Improvements in service levels will also induce (increase the amount of) travel by these other modes.

It is important to separate "transportation" into its components: mobility, circulation and access. Of course, we tend to use the word "mobility" as a broad catchall phrase for "transportation." The fact that we have widely varying colloquial uses and meanings for these and other transportation terms and words is unfortunate, but unavoidable. It has been said that Americans like to drive on parkways and park on driveways.

In any event, for transportation planning purposes these words do have specific and important meanings:

- *Travel* is the ability to move over distances. Mobility has to do with the interaction between people and regional geography.
- *Circulation* is the ability to move about within an area, connecting different localized land uses. Density and efficiency of local transportation networks affect circulation.
- *Access* is the ability to get "in the door." Access is about physically reaching — gaining access to — destinations.

Redmond's residents and community leaders understand this challenge intuitively. They speak of the lack of connections between neighborhoods and commercial areas. They express concern that the Downtown serves more as a conduit for pass-through traffic than as a destination. At the same time, they desire good travel time — by auto and by transit — to other parts of the region.

Achieving the community vision articulated in Redmond's Comprehensive Plan will require emphasizing those aspects of transportation required to support the desired land use or land development pattern. Major employment areas require high levels of mobility for commuting and good circulation for distribution of trip ends. Downtowns and other destination commercial areas require high levels of circulation and good access. Higher density, mixed-use areas require pedestrian environments tied to good, multimodal circulation systems.

Facilities designed primarily for travel offer high travel speeds and high levels of capacity. They are not connected to adjacent lands and develop no symbiosis with nearby land uses. Directional flows are segregated to reduce friction and increase travel speed. Connections to land uses and the community are made only at specific points (interchanges, transit stations). Examples include freeways, rail transit and some express bus routes.

Figure 3.2 Facilities for travel

Facilities designed primarily for circulation offer a fine-grained, highly-connected network of parallel and intersecting routes. Within a specific area (say, a downtown or an activity center) several potential alternatives exist for travel between two points. Turning movements are convenient. Travel flows are two-way and travel speeds are low (less than 35 mph). While the capacity of any one facility is limited, the capacity of the system is high because of the density and interconnectedness of facilities.

Figure 3.3 Facilities for circulation

Facilities designed for access offer frequent, direct connections to abutting land uses (driveways, bus stops). Access facilities are necessarily multimodal, with the pedestrian mode becoming essential to completing the trip. Another way to think of access is as "producing pedestrians." Parking (especially curb parking) and transit centers are two examples of important intermodal facilities needed for good access. Access is the most important element of overall mobility for business because good access is essential to the delivery of both customers and freight.

Figure 3.4 Facilities for access

Recent Community Travel Trends

❶ DEMOGRAPHICS

The city of Redmond has experienced a significant amount of population, job, and dwelling unit growth since 1980. The trends highlight the relationship in the amount of growth in jobs compared to population during the past 20 years.

What are the demographic trends?

- The City of Redmond has become a "job rich" community in the last two decades; more jobs than residents.
- From 1980 to 2000 employment growth exceeded resident population growth.

	1980	1990	2000
Population	23,318	35,800	45,256
Jobs	12,035	30,101	67,707
Dwellings	8,721	14,972	20,296

Figure 3.5 Demographic trends

	1980-1990	1990-2000
Population	54%	26%
Jobs	150%	125%
Dwellings	72%	36%

Figure 3.6 Demographic percent change

❷ MOTOR VEHICLE TRAVEL

Traffic data for freeways and all other roads were analyzed for trends from 1993 – 2003. The classifications provide a simple way to present traffic trends over a long period of time. For a more detailed traffic analysis consult the Thoroughfare Plan in Chapter 5D. The "all other roads" classification includes roadways in the City of Redmond that are publicly owned and maintained. Traffic data for freeways was provided by Washington Department of Transportation and data for all other roads was assembled from the City of Redmond traffic count program. All data is presented as Average Annual Daily Traffic (ADT). Traffic volumes on state highways in the vicinity of Redmond were studied to determine the annual growth rate of regional traffic between 1998 and '2003. While some highways have similar traffic growth to that seen on Redmond roadways, other highways, specifically SH 520 and I-405, have seen slower growth in the past 5 years. This is mainly due to the same phenomena discussed in the previous section: much of the growth in traffic volumes on these highways occurred prior to 2000.

What are the motor vehicle travel trends?

- Traffic is growing in Redmond on every type of roadway.
- Since 1993 traffic has grown at a much higher rate along SR 520 compared to all other roads in Redmond.
- Over 97 percent of the growth on SR 520 occurred prior to 2000 (between 1993 and 1999).

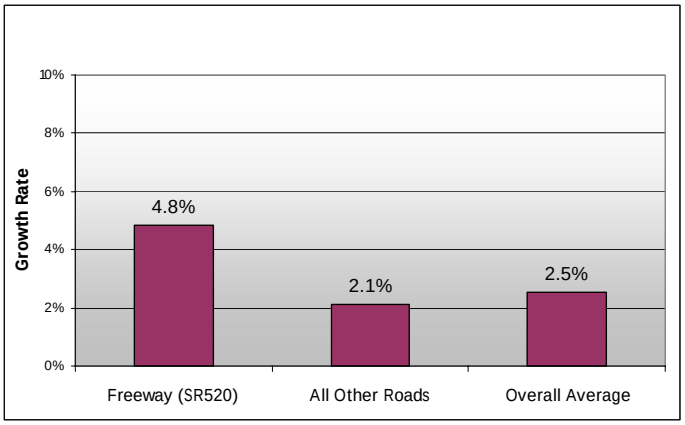

Figure 3.7 Average annual traffic growth on Redmond roads (1993 to 2003)

Highway	Annual Growth 1998 - 2003
SR 9	2.6%
I-90	2.3%
SR 202	2.1%
SR 203	2.6%
I-405	1.2%
SR 520	1.8%
SR 522	2.9%
Average Regional Growth	1.6%

Figure 3.8 Average annual traffic growth on regional roads (1998 to 2003)

Collision Analysis

Collision (or accident) data collected from Police reported collisions for motor vehicles, pedestrians and vehicles is maintained by the city of Redmond. Using historic data from 1993 to present collisions were analyzed for the entire city. The total number of collisions was then compared to annual traffic volumes to determine the trends in collision rates.

What are the motor vehicle travel trends?

- Over the past decade, the number of collisions occuring on Redmond roads each year has fluctuated from over 699 to nearly 1000. The average is just over 800.
- The number of annual collisions involving injuries also fluctuated over the years from about 32% to 19% of total collisions with an average of about 27%..
- There have been no fatalities from traffic collisions in the past few years. Since 1994, all fatalities in traffic collisions occurred in collisions involving a bicyclist or pedestrian.
- The number of traffic collisions involving bicyclists or pedestrians has also fluctuated in the past six years between 2 and 3.6% of all traffic collisions. This is about 17 - 34 collisions each year.
- Total collisions for each of the last three years have remained relatively stable compared to the average over the ten year period. The percentage of injury collisions during the last three years has shown a slight annual decline compared to the average.
- With a traffic increase of over 25% in Redmond over the last 10 years (about 2.5% per year), the recent three years of collision data reveal a downward trend in the number of collisions relative to traffic volumes.
- This downward trend in vehicle collision rates is attributable to the City efforts in enforcement, education, and engineering solutions. The commitment to funding improvements such as access management (restricting or restructuring left turns), intersection improvements (new traffic signals, signal modifications, and turn lanes), and other improvements (flashing devices, higher visibility signs and markings, and traffic calming features) have made significant contributions to the reducing the number of potential collisions.

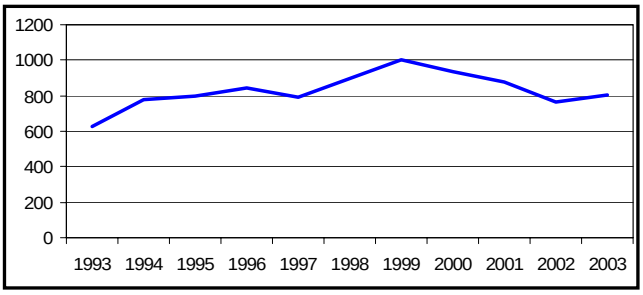

Figure 3.9 1993 to 2003 motor vehicle collisions (average = 820/year)

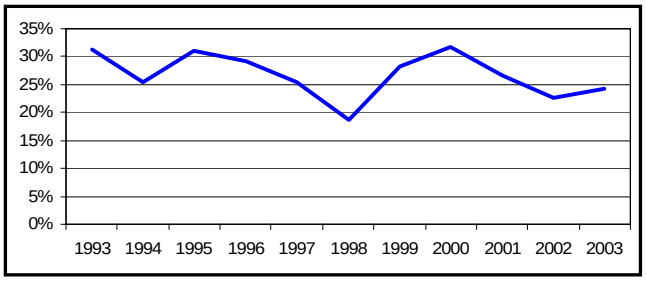

Figure 3.10 1993 to 2003 motor vehicle collisions with injury (average = 27%/year)

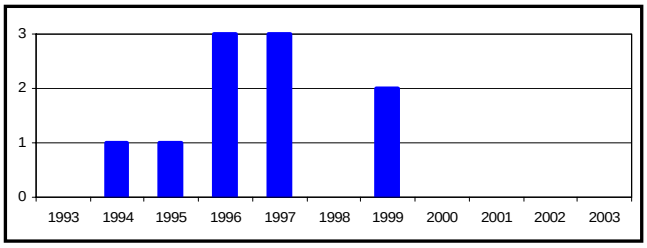

Figure 3.11 1993 to 2003 motor vehicle collisions with fatalities

Figure 3.12 1993 to 2003 rates were not ready for this draft.

❸ TRANSIT

King County Metro and Sound Transit keep historical ridership data for fixed routes with a scheduled stop in Redmond. Each of the agencies provided historical ridership datasets. Metro ridership coves 1990-2003 and Sound Transit covers 2000-2003. Specific highlights of Redmond's transit service include:

- Metro currently operates 26 fixed routes in the city of Redmond and Sound Transit operates two;
- METRO has discontinued or merged segments of service on twenty-three routes since 1990.

Annual (average daily) revenue hour data was compared to annual (average daily) boarding data to provide a general assessment of recent trends. Data is not available to provide insight on the effectiveness of spot improvements in a particular area or along a specific route. The following figures show details for Metro and Sound Transit routes with scheduled stops in Redmond from 1990 to 2003:

- The level of transit service in Redmond increased by 307 hours.
- The number of passengers boarding per revenue hour decreased by 6.7 persons.

What are the transit trends?

- Ridership has grown at a modest pace since 1990, but the level of service available to the community has experienced significant growth since 1990.
- As a result, the number of boardings per revenue hour has decreased since 1990.

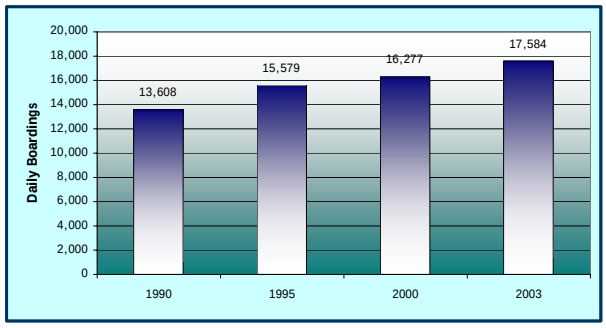

Figure 3.13 1990-2003 Annual (average daily) Redmond Boardings (Weekday Metro & Sound Transit)

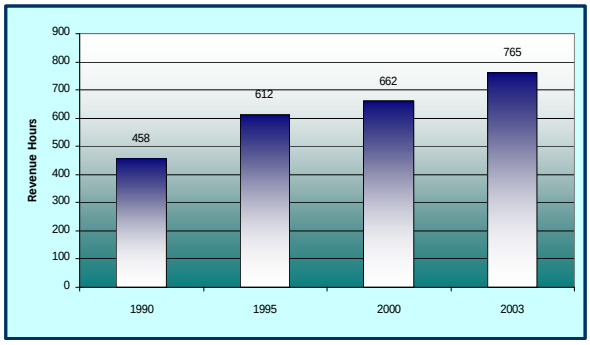

Figure 3.14 1990-2003 Annual (average daily) Redmond Transit Revenue Hours (Metro & Sound Transit)

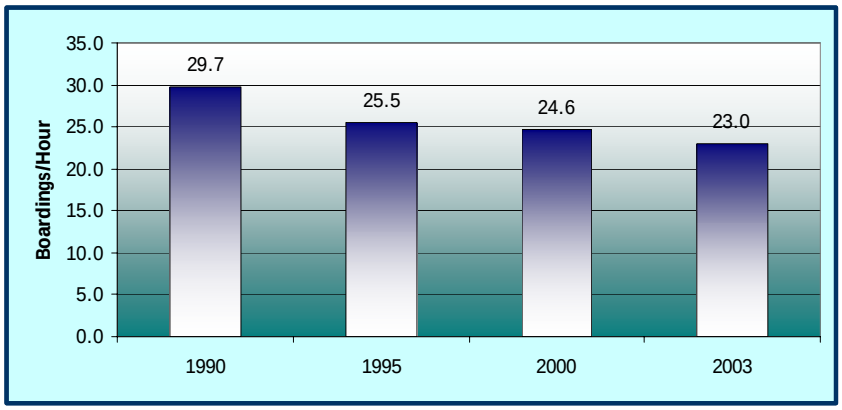

Figure 3.15 1990-2003 Boardings per Revenue Hour (Metro & Sound Transit)

Corridor Analysis

Stop level data, including transit ridership and revenue hours during peak and off-peak periods, along three corridors in Redmond from 1995 to 2003 was analyzed in detail to gain a better understanding of transit trends in unique areas of the city. The analysis looked at two north-south corridors, 148th Avenue NE and 156th Avenue NE between NE 31st Street and NE 51st Street, which serve different land uses. The downtown section of Redmond Way, between 148th Avenue NE and SR 520, was also studied.

148th Avenue NE (NE 31st St. to NE 51st St.):

- The corridor has a mix of moderate density residential and campus-style office parks.
- This corridor historically was served by an average of 8 stops and 7 routes.
- Ridership and revenue hours follow a similar pattern over the time period.
- Ridership fluctuated during the eight-year period, however, the level returned to where it started in 1995 (about 300 riders).
- The corridor currently is pedestrian tolerant and has no separate bicycle facilities.

156th Avenue NE (NE 31st St. to NE 51st St.):

- The corridor is mostly campus-style office parks with some low and moderate density residential.
- This corridor historically was served by an average of 18 stops and 10 routes.
- Ridership increased at a faster pace than revenue hours until 2001. Thereafter ridership decreased and revenue continued to slowly increase.
- The corridor currently is pedestrian tolerant and has off-street bicycle facilities.

Redmond Way (148th Avenue NE to SR 520):

- The west side of Redmond Way has high density residential and the east side of the corridor has a variety of commercial uses.
- This corridor historically was served by an average of 17 stops and 8 routes.
- Ridership levels increased slightly in 1999 as revenue hours were decreasing. Both ridership and revenue hour levels are lower in 2003 than they were in 1995.
- The majority of the corridor is pedestrian tolerant with some supportive nodes. There are no separate bicycle facilities.

What are the ridership and revenue hour trends in the major transit corridors?

- Revenue hour increases have not resulted in noticeable ridership increases.
- The presence of transit facilities, such as high quality stops, support higher levels of ridership in corridors (i.e., 156th Avenue NE corridor).
- Redmond Way and 156th Avenue NE have a similar number of stops, routes and revenue hours, but the ridership numbers are much lower in the Redmond Way corridor.

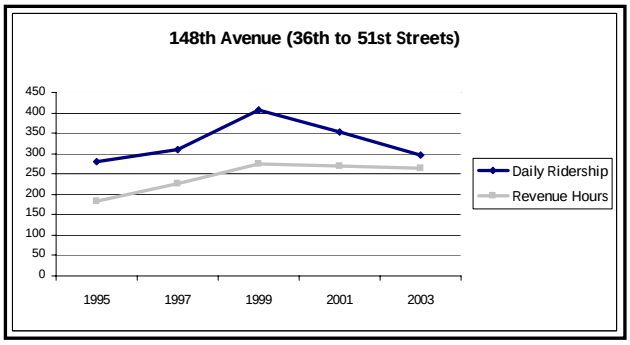

Figure 3.16 148th Ave NE Transit trends

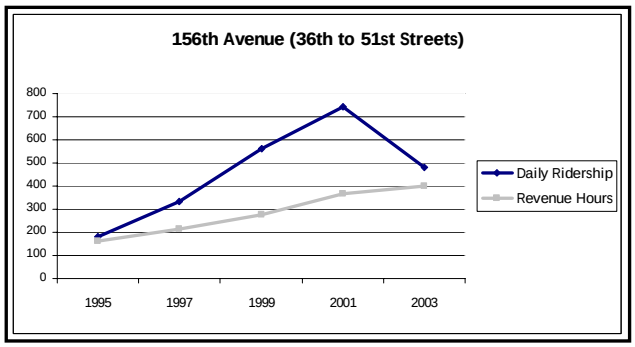

Figure 3.17 156th Ave NE Transit trends

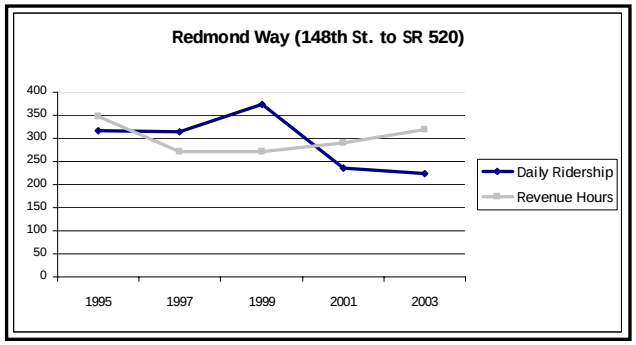

Figure 3.18 Redmond Way Transit trends

❹ TRAVEL MODE SHARE

Travel mode share defines how people travel in Redmond by different types of transportation modes. The most common modes of travel in Redmond are automobile, transit, bicycle and walking. Mode share in Redmond is collected for the work commute and other daily personal trips. The data sources below report the mode share split for the Redmond work commute:

- **Commute Trip Reduction (CTR)** data is collected as required by the 1991 Washington State Clean Air Act, enacted to reduce traffic congestion, air pollution and fuel consumption by reducing vehicle trips. The law requires that local jurisdictions and employers work together to define programs at individual worksites encouraging employees to travel to work using alternatives to driving alone, including car/vanpool, bicycle, walk, public transit, compressed work weeks and flexible work schedules. Eighty-one Redmond employers currently participate in the CTR program, employing a total of almost 43,000 workers. It is important to note employers with less than 100 employees are not required to participate in the program.

- **Journey To Work (JTW)** tables report limited data about commuting collected in the decennial census. Data about personal travel is not collected. This dataset provides information solely about Redmond residents and their commute to work.

- **The Land Use Transportation Air Quality Health Study (LUTAQH)** was commissioned by King County in 1999 to "establish and implement community design principles and transportation investment policies that improve accessibility, air quality and public health within King County and the central region." Just over 180 Redmond residents completed travel diaries documenting every trip taken during a 24-hour period in the fall of 2003 as part of the research. While the sample size is small, these diaries include data on personal travel and provide the most complete look at overall mode choices of Redmond residents.

Missing Data: The majority of mode share data collected in Redmond focuses on work commute trips. This data only details 25%-30% of the overall travel picture in a given day.

What are the work commute mode share trends?

- All three surveys report that about three-quarters of workers commuted by single occupant vehicle, much like the trend seen nationally, illustrating that there is still mode share management necessary for the City of Redmond to meet the 30% alternative (non-SOV) modes commute goal found in the Redmond Comprehensive Plan Transportation Element.

- The CTR results show almost six percent more car/vanpools than JTW or LUTAQH. The increased car/vanpool results are likely explained by the CTR program emphasis on employer-subsidized vanpools.

- The CTR survey returned significantly lower walk rates than the other two surveys. The low rates of walking in the CTR survey may be a reflection of the large size of the businesses participating in the program and the likelihood that many employees travel from outside of Redmond.

Mode	Census 2000 Redmond	2003 CTR	2003 LUTAQH	Census 2000 National
Drove alone	76.2%	75.2%	73.2%	75.8%
Car/vanpooled	11.3%	17.1%	11.0%	12.2%
Public transit	4.2%	3.1%	4.7%	4.7%
Bicycle	0.8%	0.7%	1.9%	0.4%
Walked	2.8%	0.9%	7.5%*	2.9%
Other means	0.4%	0.0%	1.3%	0.7%
Worked at home	4.3%	3.0%	N/A	3.3%

Figure 3.19 Redmond work commute mode split

*The high number of walkers recorded by the LUTAQH study result of coding differences.
** 2003 CTR data= 13% carpool and 4.0% vanpool

Survey Population Descriptor	Members of the Population Represented	Sample Size
Census 2000 Redmond	Workers 16 years and older, residing in Redmond city	25,638
2003 CTR	Employees of the Redmond employers participating in the CTR program	42,620
2003 LUTAQH	Redmond residents, 16 years and older	184
Census 2000 National	Workers 16 years and older, residing in the United States	128.3 million

Figure 3.20 Population represented in each survey

Because the Census and CTR surveys do not collect data on personal trips they cannot be used to determine travel mode share for other times of day. In order to understand how people in the Redmond area travel for non-work related trips the LUTAQH travel diary data was analyzed. Because this data is a relatively small sample size, the National Household Travel Survey (NHTS) was used as a comparison. The NHTS data is a national study and not the most accurate profile of local travel behavior, but offers an interesting comparison to the LUTAQH data.

The results of the Redmond portion of the LUTAQH study are details on the following pages. The trends in the adjacent the column were calculated using the results.

Figure 3.21 The LUTAQH research model

What are the mode share trends for all trips?

- When all daily trips are included, the number of single occupant vehicle trips (SOV) reduces dramatically that seen in the work commute.
- The overall share of trips made in a vehicle remains about the same, but many more are made in cars with more than one person (HOV).
- When compared to national trends, the LUTAQH study reports that Redmond residents travel less often by personal vehicle, and more often by public transportation, bicycle and foot.
- More than one half of daily trips are less than 5 miles in length (see Figure 3.23).
- In fact, 30 percent of the trips are less than one mile in length. As the trip length increases, so does the SOV share of the number of trips (see Figures 3.23 and 3.24).
- Figure 3.25 shows that the average SOV trip length is longer than the average HOV trip length. The average length of transit trips is about 3 to 4 miles longer than average trip length for personal vehicles.

Figure 3.22 Mode share comparison of LUTAQH and NTPS

Mode	2004 LUTAQH Work Commute	2004 LUTAQH Total Daily Trips		2001 NHTS Total Daily Trips**
SOV	73.2%	44.2%	83.8%	86.4%
HOV	11.0%	39.6%		
Public Transit	4.8%	4.4%		3.7%
Bicycle	1.9%	1.2%		0.8%
Walk	7.7%	10.0%		8.7%
Other	1.3%	0.5%		0.4%
TOTAL	100.0%	100.0%		100.0%

**National Household Travel Survey (NHTS) provides national estimates of the daily travel patterns of U.S. households. It is sponsored by the U.S. Department of Transportation and now integrates the Nationwide Personal Transportation Survey and the American Travel Survey.

Mode	<1 mile	1 to 2.5 miles	2.5 to 5 miles	> 5 miles	Total
All Modes	30.5%	21.7%	14.3%	33.5%	100.0%
SOV	20.9%	23.9%	16.2%	39.0%	100.0%
HOV	27.2%	24.0%	15.2%	33.6%	100.0%
Transit	25.5%	8.8%	7.8%	57.8%	100.0%
Bike	7.4%	44.4%	29.6%	18.5%	100.0%
Walk	92.6%	7.0%	0.4%	0.0%	100.0%
Other	0.0%	0.0%	75.0%	25.0%	100.0%
Total	30.5%	21.7%	14.3%	33.5%	100.0%

Figure 3.23 Distance category by mode share

Mode	<1 mile	1 to 2.5 miles	2.5 to 5 miles	> 5 miles	Total Share of All Trips
SOV	30.3%	48.7%	50.0%	51.6%	44.2%
HOV	35.3%	43.9%	42.1%	39.7%	39.6%
Transit	3.7%	1.8%	2.4%	7.7%	4.4%
Bike	0.3%	2.4%	2.4%	0.6%	1.2%
Walk	30.3%	3.2%	0.3%	0.0%	10.0%
Other	0.0%	0.0%	0.0%	0.4%	0.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 3.24 Mode share by distance category

Mode	Avg. Trip Length (miles)
SOV	6.3
HOV	4.9
Transit	9.0
Bike	5.5
Walk	0.5
Other	5.12

Figure 3.25 Average trip length by mode

Community Travel Forecasts

❶ DEMOGRAPHICS

Demographic projections for Redmond have been assembled from a variety of sources to arrive at build-out forecasts. The city of Redmond Planning Department, based on the preferred growth strategy in the Comprehensive Plan and other regional data sources, provided the following information. As shown, Redmond will begin to improve the job-population balance by adding new dwelling units and attracting new residents to existing housing. In the future Redmond will continue to be a major destination for employment.

	2002	2022*	% change
Population	46,040	65,820	43%
Jobs	72,247	76,830	31%
Dwellings	20,892	30,387	45%

Figure 3.26 Demographic forecasts table

Notes
* Preferred Growth Strategy
Source
Jobs 2000: Puget Sound Regional Council tally of jobs covered by state unemployment insurance and from WA state data.

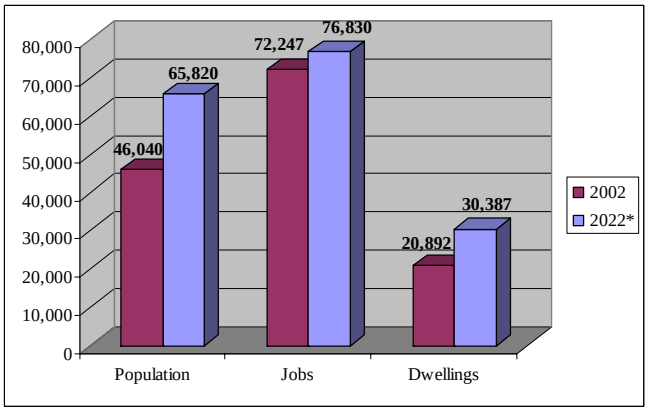

Figure 3.27 Demographic forecasts chart

❷ MOTOR VEHICLE TRAVEL

Traffic volumes on Redmond roads were forecast through 2022. Figure 3.28 represents average annual growth in traffic volumes over the past decade and the average growth rate expected over the next twenty years. A more detailed analysis on the future growth expected in specific Redmond locations is available in the Thoroughfare Plan in Chapter 5D.

- Traffic volumes are expected to continue to grow on Redmond roads over the next two decades.
- The traffic growth is forecast to continue at the same pace as seen on Redmond roads in the past decade.
- Note that the growth rates in Figure 3.28 were calculated using slightly different methodologies. The forecast model incorporates many low volume roadways that were not previously used in calculating growth rates. In the past, growth rates were determined using available traffic counts, which are focused on critical, and usually higher growth, roadways.

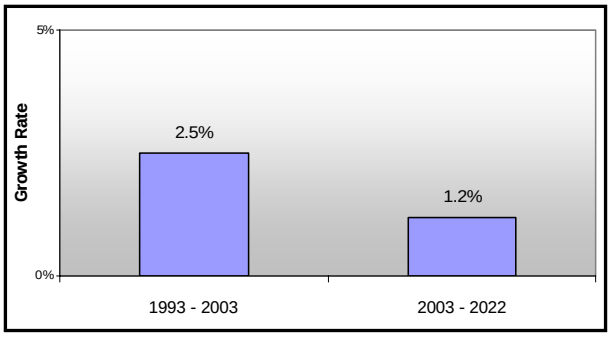

Figure 3.28 Average annual traffic growth on Redmond roads 1998 - 2022